THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

Volume XII DECEMBER, 1939 No. 10

New Members Are Appointed To Committees

Board of Trustees Confirms Presidential Appointments; Complete Roster Given

At the meeting of the Board of Trustees of the A.S.M. held Nov. 17, new appointments to the various national committees of the Society were announced. (The complete minutes of the meeting are printed on page 2.)

In order that the members may have a roster of the national committees as they are constituted at the present time, the complete personnel is listed below. The new appointments are shown in italic type and the numerals represent the date of expiration of membership.

Finance Committee

Kent R. Van Horn, Cleveland, chairman
Leslie S. Fletcher, Philadelphia, '42
Zay Jeffries, Cleveland, '41
G. M. Rollason, Garwood, N. J., '42
J. M. Schlendorf, Cleveland, '40
Leon D. Slade, Rochester, N. Y., '41

Metals Handbook Committee

R. S. Archer, Chicago, chairman, '40
J. E. Donnellan, Cleveland, secretary
E. L. Bartholomew, Beverley, Mass., '40
A. D. Beeken, Jr., Aliquippa, Pa., '40
W. Paul Eddy, Jr., Pontiac, Mich., '41
Robert F. Mehl, Pittsburgh, '42
H. B. Pulsifer, Cleveland, '42
A. O. Schaefer, Philadelphia, '40
S. C. Spalding, Waterbury, Conn., '41
A. P. Spooner, Bethlehem, Pa., '42
Lyall Zickrick, A.I.M.E. representative
H. L. Maxwell, A.W.S. representative
John Howe Hall, A.S.T.M. representative
C. W. Obert, I.A.A. representative

Educational Committee

Reid L. Kenyon, Middletown, Ohio, chairman, '40
Edgar C. Bain, Pittsburgh, '40
A. A. Bates, Pittsburgh, '42
William Conley, Rochester, N. Y., '41
Harry P. Croft, Cleveland, '40
Horace C. Knerr, Philadelphia, '41
Walter M. Saunders, Jr., Providence, R. I., '42

Publication Committee

L. W. Kempf, Cleveland, chairman, '40
Ray T. Bayless, Cleveland, secretary
W. H. Bassett, Jr., Hastings-on-Hudson, N. Y., '40
L. S. Bergen, New York, '42
A. L. Boegehold, Detroit, '40
J. L. Burns, Chicago, '40
M. Gensamer, Pittsburgh, '41
R. H. Hobrock, Detroit, '40
J. J. Kanter, Chicago, '41
B. L. McCarthy, Buffalo, '41
M. J. R. Morris, Massillon, Ohio, '41
J. F. Oesterle, Madison, Wis., '42
W. H. Swanger, Washington, D. C., '40
Sam Tour, New York, '41
John P. Walsted, Whitinsville, Mass., '42
A. W. Winston, Midland, Mich., '42

Constitution and By-Laws Committee

C. H. Shapiro, Houston, Texas, chairman, '40
Bernard Collitt, Montreal, '40
Paul Farren, Greenfield, Mass., '41
Norman Goss, Youngstown, Ohio, '41
Robert L. Heath, Indianapolis, Ind., '42
Norman Stotz, Titusville, Pa., '42
Herbert J. French, representative of the Board of Trustees

METAL PROGRESS Advisory Committee

James P. Gill, president A.S.M.
Oscar E. Harder, vice-president A.S.M.
W. H. Eisenman, secretary A.S.M.
R. T. Bayless, assistant secretary A.S.M.
E. E. Thum, editor
C. Y. Clayton, Rolla, Mo., '40
J. J. Crowe, Jersey City, N. J., '42
Keith J. Evans, Chicago, '41
T. S. Fuller, Schenectady, N. Y., '40
Zay Jeffries, Cleveland, '41
A. J. Phillips, Barber, N. J., '42
Gordon T. Williams, Moline, Ill., '41

Chairmen of A.S.M. Standing Committees

Chairmen of the Various Standing Committees of the A.S.M. Are, Left to Right: Kent R. Van Horn, Finance Committee; R. S. Archer, Metals Handbook Committee; Reid L. Kenyon, Educational Committee; L. W. Kempf, Publication Committee; C. H. Shapiro, Constitution and By-Laws Committee. The METAL PROGRESS Advisory Committee is headed by the president and the editor.

California Professors Elucidate Grain Size And Austempering at Golden Gate Meeting

By C. L. Dornbush

Golden Gate Chapter—In a coffee talk at the October meeting 50 members and guests were instructed in the use of the employment service now offered by the Society. Harry B. Smith of the Pacific Audit and System Co., the San Francisco-Oakland representative, gave a complete description of the use and scope of this remarkable employment service.

The technical session was covered by Prof. N. F. Ward and Prof. John E. Dorn of the University of California. Professor Ward spoke first on "Grain Size and its Practical Application" basing his talk on recent technical literature.

His introduction brought out that the Metcalf specimen was one of the original ways of indicating grain size variation and is still a practical and rapid method as the fracture grain size correlates with the austenitic grain size.

Fine grains make for difficult forging because of their resistance to slip. It is necessary to heat to above coarsening temperature to obtain ease in forging.

Fine-grained steel is also partial to soft spots when carburizing, and is shallow hardening, but does give a better surface finish as measured by the Erichsen test.

Mr. Ward also found that grain size can be a function of time at a given temperature, and closed by stating that grain size is an excellent index to the forming, machinability, forging, carburizing, heat treating, and creep properties of steel. These facts were borne out by slides showing significant data.

Professor Dorn's discussion of "Austempering" was based on the early works of Bain and Davenport, the more recent contributions of Legge, and on various British works. Mr. Dorn explained austempering as a single operation of simultaneous quenching and tempering in which the decomposition of austenite is delayed.

The time for the decomposition to take place varies with the temperature and the steel treated. At 400° F. an S.A.E. 1080 steel may require 24 hr. to decompose completely to bainite.

The properties of all steels are not improved by austempering but plain carbon and low alloy steels respond properly to yield products of high hardness and remarkably high ductility.

Professor Dorn illustrated his talk with slides of the "S" curve and photomicrographs.

Compliments

To **Walter M. Saunders, Jr.** of Providence, R. I., new member of the A.S.M. Educational Committee, who received his Sc.D. in metallurgy from M.I.T. last June.

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To **Robert F. Mehl**, head of Carnegie Tech's metallurgy department, who has been selected to deliver the Campbell Memorial Lecture of the A.S.M. at the Convention in 1941. Also to **Sam Hoyt**, selected last year to deliver the Campbell Lecture in 1940.

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To **C. Newman (Bunny) Dawe** and his committee of "steel men" who arranged for a joint Rotary-A.S.M. meeting in Detroit, with **Past President Woodside** featuring his "Panorama of Alloys in Steel."

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To **Emmett W. Moore**, chairman of the Rochester Chapter, who said, "I have been a member of the American Society for Metals for many years and, as I thought, an enthusiastic member; however, one must attend a national convention, such as held in Chicago, and observe the tremendous opportunity for education and association to really understand the American Society for Metals."

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To the **Montreal Chapter** which will again distribute Christmas baskets of food to 30 families of the Canadian National Institute for the Blind.

Innovations in Plant Structure Amaze Visitors

New Simonds Saw & Steel Factory Has no Windows, Partitions, nor Elevators

By J. V. Baxter

Boston Chapter—An inspection trip through the new windowless factory of the Simonds Saw & Steel Co. at Fitchburg, Mass. proved very interesting to 150 members on Nov. 3.

All manufacturing operations are housed in one building covering about five acres of ground. There are no windows, no skylights, no shadows, no partitions, no stairways, and no elevators. Air, light, humidity and sound are all controlled.

The spectacle of the office and engineering department adjacent to the manufacturing departments with no partitions between was unique. A short distance away, the heat treating departments in the line of production, with no smoke nor gas in evidence, were something for any metallurgist to think about.

From observation platforms, the progress of work along the production lines could be observed, during the various manufacturing operations on crosscut saws, circular wood and metal saws, band saws, knives and files.

Following dinner Dr. George B. Waterhouse, past president of the Society, gave a few remarks concerning activities at the annual convention in Chicago.

Ralph A. Gilchrist of the Simonds Saw and Steel Co. then delivered the technical address. Speaking on "Files and File Making", he covered the important manufacturing steps.

The necessity for careful annealing was stressed. Files are cut singly or in multiple to produce uniform depth of teeth. Therefore the hardness of each must be comparable.

Another important factor is the draw-filing operation. It has been determined by experiment that the average pressure exerted by a mechanic when using a file is about 13 lb.

In order to produce the right "feel" to the file in the hands of a mechanic, the surfaces of the files are draw-filed before cutting the teeth. Grinding would not produce the right "feel".

The shape of the teeth is carefully controlled, and after cutting, the files are inspected, straightened, washed, and covered with paste to prevent lead sticking to the teeth during hardening.

Hardening is performed in lead on a time cycle varying with size. Temper-

(Continued on page 7)

Technical Discussions

Written and oral discussions of the preprinted papers presented at the A.S.M. technical sessions of the National Metal Congress held in Chicago last October are now in printed form.

While it is impossible for the Society to furnish all discussions on all of the papers to any one member, nevertheless the Society is able to send free of charge to any member the specific discussion on any specific paper the member might request.

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RAY T. BAYLESS.....*Editor*
M. R. HYSLOP.....*Managing Editor*

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New Refractories Are Offered to Canadian Metal Industries

By J. W. McBean

Ontario Chapter—At the November 3rd meeting a comprehensive paper on "Recent Developments in Refractories for the Metal Industries" was given by J. W. Craig, manager of development and research for Canadian Refractories Limited, Montreal.

Rapid progress has taken place recently in the improvement of raw materials, method of manufacture and finished products and in the technical application of refractories. As a result the production of metals has been made faster and cheaper.

Among the newest products which have been offered the metal industries are:

1. Super quality clay brick for higher operating temperatures.
2. De-aired fireclay brick of a much denser structure for particular application in checkers and cupolas.
3. Non-spalling and high load bearing magnesitic and chrome brick for use in superstructures of steel furnaces.
4. High alumina and high silica ramming materials for the roofs of electric melting and forging furnaces and the lining of iron cupolas.
5. Magnesite ramming materials for all types of metal melting furnaces.
6. Magnesite, chrome, silica and fireclay types of high temperature cements of distinctly improved chemical composition permitting a much wider application.

Canadian metallurgical industrial concerns are believed to have been the world's pioneers in the following interesting refractory applications:

1. The complete replacement of silica with magnesite brick in copper reverberatory furnaces.
2. Adoption of monolithic magnesite bottoms in copper anode furnaces.
3. Adoption of silica cement for laying all types of silica brickwork.
4. Rammed magnesite hearths in electric steel and copper reverberatory and anode furnaces.
5. Rammed Sillimanite linings for gold refining furnaces.
6. Adoption of quick-setting magnesitic clinker for open-hearth furnace bottom construction and maintenance.

Many colored slides were used to illustrate the application of the range of refractory materials and insulation in various industrial furnaces.

Minutes of Board of Trustees Meeting

All Board Members Are Present at Meeting Held In Cleveland November 17

Present at the meeting of the Board of Trustees of the American Society for Metals, held in the national office in Cleveland on Nov. 17 were James P. Gill, president; Oscar E. Harder, vice-president; Kent R. Van Horn, treasurer; William H. Eisenman, secretary; and William P. Woodside, Donald S. Clark, Francis B. Foley, Herbert J. French, and Marcus A. Grossmann, trustees.

First order of business was the appointment by the President of new members to the various standing committees of the Society. All appointments were unanimously confirmed by the Board, and are listed on page 1.

Treasurer Van Horn then presented the report of the meeting of the Finance Committee. Before any definite action was taken the Treasurer covered in a comparative and comprehensive manner the balance sheet, investment list, advertising accounts receivable, surplus reconciliation statement, income and expense general, Detroit Show, Chicago Show, and the inventory.

Budget Approved

These items as submitted were the same as contained in the financial audited report submitted by Ernst and Ernst, which is on file in the Treasurer's office, and is published in the December 1939 issue of TRANSACTIONS.

Upon motion by Mr. Van Horn, seconded by Mr. Foley and unanimously carried, the Board of Trustees accepted the balance sheet and all its supporting data and statements as recommended by the Finance Committee (also published in December TRANSACTIONS).

The Board of Trustees accepted the recommendation of the Finance Committee and authorized the purchase of one Baby U. S. Government Bond, face value $10,000, for $7500, and also 100 shares common stock, Hartford Fire Insurance Co.

The Board of Trustees then observed carefully and unanimously approved the budget for 1940 as prepared by the Finance Committee and submitted for its consideration. This is likewise published in the December issue of TRANSACTIONS.

Publication Committee Meets

The Secretary then presented a brief report of the regular meeting of the Publication Committee held in Chicago, Oct. 25. Present were Messrs. Bayless, Boegehold, Chipman, Cook, Gensamer, Hobrock, Kanter, Krivobok and Kempf.

At this meeting the subject "Surface Treatments for Metals" was selected for the 1940 Convention Symposium. Details of the Symposium and an invitation for contributions have been published in the November issue of THE REVIEW.

The Secretary then reported on the meeting of the Educational Committee on Nov. 9 in Pittsburgh. Two lecture series were established for presentation at the 1940 Convention.

1940 Lectures Established

The first series of five lectures will be presented by Dr. Maxwell Gensamer of Carnegie Institute of Technology on the subject of "Behavior of Metals Under Stress" or "Strength of Metals." Dr. Gensamer met with the Committee and submitted an extensive outline of his lectures.

For the evening series of three lectures the subject of "Quenching of Steels" was selected. Three authors are to present this series—namely, A. Allan Bates of Westinghouse Electric & Mfg. Co., W. J. Conley of University of Rochester, and R. G. Roshong of Lindberg Engineering Co.

It was further stated that it would soon be time for letters to go out extending an invitation for the presentation of papers at the Cleveland convention.

Preprints Discussed

The Secretary then presented the following report on preprints:

"It is to be observed that the cost of preparing preprints and forwarding them to the membership totaled approximately $9000. This is an increase of $3000 over the previous year, and it is becoming more and more difficult to make an estimate of the number of copies required.

"The list of preprints was published in THE REVIEW and the members were requested to send in their orders a full month in advance of the date the first preprint was to go on the press.

"On that date there was a total of only 600 orders in headquarters. However, Mr. Bayless followed his previous print order and printed 1250 copies of each paper. One month before the convention the requests from members for preprints began to come in very heavily and the supply was completely exhausted.

"Unfilled orders piled up, and in order not to disappoint the members an additional printing of 650 copies was made of each preprint. Altogether the Society forwarded to the members over 60,000 copies of the various papers.

"Of course the Society makes no objection to doing this and it is a pleasure to know that the members are so interested in the papers. However, a plan should be inaugurated which will give the Cleveland office a more definite idea as to the preprint requirements.

"Therefore it is suggested that a regulation be passed by the Board of Trustees that notice be sent to the membership at the time the list of preprints is published stating that members will be entitled to the preprints on all orders received up to and including a certain time, which will be the date on which it will be necessary to go to press.

"It might be stated in the original announcement that the Society will probably publish 10% in excess of the number of orders in the office on press date and this 10% will be sent out as long as it lasts, but the Society will assume no obligation of forwarding preprints after this 10% margin has been exhausted."

Deadline Set for Preprint Orders

After discussing this subject it was moved, seconded, and unanimously carried that the August issue of THE REVIEW should carry the list of papers that are to be presented at the convention and that are to be preprinted, and an announcement to the effect that all orders received up to Sept. 10 would be filled. After that time orders could be accepted only so long as the additional print order lasted.

A statement on the publication of technical discussion was then presented and it was moved that in the next issue of THE REVIEW announcement should be made that while it is impossible for the Society to furnish all discussions on all the papers presented at the Chicago convention to any one member, nevertheless the Society would be able to send free of charge to any member the specific discussion on any specific paper the member might request.

A report on the National Metal Exposition to be held in Cleveland Public Auditorium Oct. 21 to 25, 1940 was presented. It was stated that floor plans would be sent out to all previous exhibitors by the middle of February or the first of March.

Because of the tremendous success of the exposition held in Chicago a great many more requests than usual are on file in the national office for space for the coming exposition and present prospects indicate that the Cleveland show will be one of the largest expositions the Society has had.

It was further reported and approved that the American Welding Society, the Iron and Steel Division and the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers, and the Wire Association are again to participate in the National Metal Congress for 1940.

Statler Selected for 1940 Convention

Upon motion properly made, seconded and unanimously carried, Hotel Statler was selected as the headquarters for the A.S.M. during the 1940 National Metal Congress and National Metal Exposition to be held in Cleveland Oct. 21 to 25.

It was moved that Robert F. Mehl of Carnegie Institute of Technology be selected as the Campbell Memorial Lecturer in 1941.

The Secretary reported that Dr. Lester, chairman of the Sauveur Memorial Committee, was carrying on the details of work in that committee but had no definite decisions to report at this time.

The committee appointed by the Board of Trustees to investigate and report on the establishment of fellowships, headed by Prof. Bradley Stoughton of Lehigh University, was unable to make a report at this meeting.

Membership Now Nearly 11,000

The Secretary stated that the membership of the Society as of Nov. 1 totaled 10,701, a gain for the month of 481.

Mr. Foley, representative (along with Albert J. Phillips and John F. Wyzalek) of the American Society for Metals on the Joint Committee on Uniform Metal Products sponsored by the Industrial Furnace Manufacturers Association, Inc., then presented a report of a recent meeting of this Committee.

It was thought by those present at the meeting that the A.S.M., which has the best organization of widespread chapters throughout the country devoted to promoting the arts and sciences of metals, would be exceptionally well adapted to inaugurating a program of technical meetings which would make the metallurgical workers conscious of the need of a greater degree of uniformity of product.

Move to Cooperate With I.F.M.A.

It was therefore resolved "that this meeting, recognizing the need of greater uniformity of metal products in the interests of industrial progress and national defense, requests the American Society for Metals, as a first step in this direction, to sponsor meetings throughout the country appealing particularly to shop men, for the purpose of fostering improved shop practices in heating and cooling of metal products."

Upon motion by Mr. Foley, seconded by Mr. Clark and unanimously carried, Mr. Foley was authorized to draft a letter of reply expressing agreement of the board with the aims of the committee and a continuing desire to be of assistance whenever possible.

Upon motion properly made, seconded and unanimously carried the meeting adjourned.

Melting Units For Cast Iron Are Evaluated

Cupola Is Most Economical, Electric Furnace Used for Special Irons, Says Bornstein

By C. A. Nagler

North West Chapter—Cast iron, said H. Bornstein, director of research, Deere & Co., Moline, Ill., speaking at the November meeting, embraces a wide range of engineering materials, but is essentially an alloy of iron, carbon and silicon.

In the selection of raw materials for castings there are both economic and geographic considerations, such as type of scrap available, type of pig available (both high and low silicon), and phosphorus content. Fuel and fluxes used in melting are also important.

The most economical melting unit is usually the cupola, which is essentially a cylindrical shaft furnace which has charged into it alternate layers of coke, limestone and metal. The air is supplied to the tuyeres through the bustle pipes and the pressure in the wind box varies from a few ounces to a pound.

In the past a great deal of high strength iron was made in air furnaces, but with better cupola practice, these are falling off in popularity.

Two types of electric furnaces are used today for production of special cast irons. With these furnaces it is possible to make small heats of varying composition, high strength irons, and for the most part to have better control over the iron.

This type of melting is usually referred to as batch melting. It finds its greatest application in the highly alloyed cast iron field. It is also possible, when melting in the electric furnace, to use up a great deal of cast iron borings and steel turnings. These can be made into briquets and used in cupola melting.

The Bracklesburg type of furnace has not found wide application in the United States, although it is widely used throughout the European continent. This is essentially a powdered coal installation and the furnace is cylindrical and rotates in a horizontal position during melting.

In a duplex melting process the iron is melted in the cupola and then refined in the electric furnace.

Another process known as a triplex melting process consists of melting the iron in a cupola, blowing out the carbon in a converter, mixing the converter metal with cupola metal, and adjusting the composition in the electric furnace.

It was interesting to hear the speaker state that specifications for cast iron have gone from 28,000 psi. to about 60,000 psi. within the past ten years.

The general subject of ladle treatment of cast iron was discussed and the speaker pointed out that this method has many advantages and its use is increasing. The Meehanite process is a patented process wherein the metal is treated in the ladle with calcium silicide.

In closing, the speaker gave a short summary of the engineering properties of cast iron. This was followed by a lively discussion of foundry problems and melting methods.

Grossmann Winds up Chicago Lectures

Dr. Marcus A. Grossmann Delivered the Last Lecture in His Course on Heat Treatment of Steel Before the Chicago Chapter on Nov. 27. Attendance for this first part of the educational program averaged 175 per meeting.

Woldman Fills All Four Requirements For Good Lecturer

Gives New Jersey's Fall Educational Course on Alloys

By Fred P. Peters

The problem of finding suitable lecturers has given your Society's educational committees more gray hairs than all the quenching-cracks laid end to end they ever saw. To find a man who is simultaneously (1) completely grounded in the theory and fundamentals of his subject, (2) thoroughly experienced in its practical phases, (3) able to convey his information clearly and interestingly, and (4) mentally agile enough to survive the inquisitorial torture of discussions, is as easy as it is to find love for welding in the hard heart of a foundryman.

New Jersey found all four, however, in Dr. Norman E. Woldman, chief metallurgical engineer, Eclipse Aviation Division of Bendix Aviation Corp., who gave the Chapter's fall educational course of three lectures on "Engineering Applications of Metals and Alloys" to large audiences at the Essex House, Newark, Oct. 30, Nov. 6 and Nov. 13.

In spite of a drenching rain the first night, attendance reached 115, then climbed to 131 the second meeting, and reached 138 the final night of the course. Credit for this excellent turnout belongs primarily to the lecturer, who did a superlative job on the platform, but credit should also go to Ryerson's J. W. Queen, Jr., educational chairman, and his committee.

Dr. Woldman devoted his first two lectures to ferrous materials—carbon steels, low-alloy steels, cast iron, stainless and heat resistant alloys, and tool steels—and his last lecture to non-ferrous alloys, chiefly of copper, aluminum and magnesium.

Of course, in something less than 4 hr. the speaker could hardly discuss the thousands of applications listed in his and Dornblatt's book "Engineering Alloys", but he did present his hearers with some cogent and extremely practical considerations applicable to the selection of certain members of several well-known groups—for example, the S.A.E. steels—for specific services, and to the engineering design of important metal products—such as cast aluminum alloy aircraft parts. For each material the general properties available and the effect of composition modifications were indicated, and then the applications made possible by these property combinations were described.

The discussions following each session revealed the tremendous working knowledge the speaker carries about in his head, for he gave helpful answers to practical queries ranging from "How should I select and heat treat steel for mating gears on small motors?" to "How useful have you found the Bengough selenious acid surface treatment for magnesium alloys to be?"

A tribute should also be paid to Dr. Woldman's scholarly attainments outside the field of metals. His occasional quotations from Chinese philosophical writings left even the single lady among his audience completely stunned.

Montreal Hears Woodside's Story, Convention Report

By J. R. Stewart

Montreal Chapter — Seventy-two members joined at dinner on Nov. 6 to welcome Past National President W. P. Woodside on his belated visit. A crowded meeting heard Mr. Woodside's stirring story, told in his own inimitable manner, of the early days and development of tool steels, and the parallel story of his inception of the Steel Treaters' Club and its transmutations into A.S.M.

This story has already been reviewed in previous issues of THE REVIEW, as has also the talking picture "Panorama of Alloys in Steel", with Mr. Woodside cast in the dual roles of first narrator and village blacksmith.

Chapter Chairman C. R. Whittemore presented an appreciative résumé of the National Metal Congress which he attended as a Montreal delegate.

Coffee talk took the form of natural color travelogues of beautiful parts of Scotland and the southern countries of England, shown by Canadian Pacific Steamship Line.

President's Bell Treated Well in Cincinnati!

Award of the President's Bell for outstanding activities to the Cincinnati Chapter this year provoked a considerable problem in deciding who should keep the Bell between meetings.

This was finally settled by loaning the Bell to sustaining member companies to put in their show cases and on their reception desks. Thus the Bell will be given plenty of publicity during its stay in Cincinnati.

Chairman Caine gives warning to other chapters that his chapter plans to do everything short of murder to keep the Bell another year!

York Finds Two Diamonds in Own Backyard

Local Talent Provides an Evening With the Aristocrats of the Metals

By A. Floyd Whalen

York Chapter, taking the suggestion from Russell Conwell's famous lecture, "Acres of Diamonds", dug in her own backyard for talent and at the annual Gettysburg meeting held on Nov. 15, treated the members and guests to an evening with the "Aristocrats of the Metals".

Charles Dietz, chief chemist of the Dental Supply Co. of York, spoke on platinum, and William F. Allen, chief chemist of the Molybdenum Corp. of America, spoke on tungsten.

Mr. Dietz needs platinum in the manufacture of teeth because it is a metal whose coefficient of expansion is so close to the porcelain of the tooth that it can be fused into the tooth without cracking the porcelain.

In securing pure platinum he found that it had almost as many unnecessary and unwanted companions as a New Deal dispenser of patronage in Pennsylvania found a couple of years ago. Some of the obnoxious aristocrats who are found sticking closer than a brother are palladium, osmium, rhodium, ruthenium and iridium.

Tooth Chemist Encounters All Metals

To get rid of these aristocratic followers of platinum requires more chemistry than most of the audience had ever absorbed in any one session before, and as the speaker outlined the metallurgical steps by which he got rid of these one by one and then found some other use for them as an alloy, all marveled how far the science of chemistry has advanced, and how much research had to be undertaken to reach our present position.

His talk somewhat resembled one long continuous chemical analysis, and if that wasn't enough to inspire awe, he made the surprising statement that the tooth chemist used or met every element from aluminum to zinc and zirconium. According to the A.S.M. Handbook that leaves out only actium but perhaps our speaker's modesty left a little territory uncovered.

However, it can be truly said that with a little dressing up his romance of platinum would easily make a best seller among the chemists.

Tungsten Uses Are Widespread

Big Bill Allen, a past chairman of the Chapter, started his paper by waking up a Mr. Average Citizen on tungsten products and carrying his audience along with him as he handled, touched, used and looked at products everywhere about him made available by tungsten.

Although tungsten is not now considered one of the aristocrats of the metal kingdom, it certainly does not belong to the proletariat but might be said to rank at the top of the bourgeoisie.

Bill's talk was also highly chemical, only varying from that of his predecessor in using larger figures—he talked of 60,000-lb. shipments of ore, with values of $50,000 carrying $13,000 duty.

One of his illustrations aptly showed how tungsten has benefited each and every one of us. The tungsten lamp which replaced the carbon filament lamp saves the consumer each year 4½ billions of dollars, three billions from the current saved and the balance in longer life and less replacement.

List of A.S.M. Employment Offices

Members of the American Society for Metals who are interested in securing a new position or firms who have a position open should communicate immediately with the nearest employment office. These offices are all members of the Employment Counsellors Association of the U. S., whose Cleveland member, the Technical Placement Service, is national employment headquarters for the Society. These employment offices are maintained to benefit the firm members as well as individual members of the Society, and companies having a position to be filled will find that these offices carry a select list of well-qualified technical men.

AKRON, OHIO
Merrill D. Wright
Central Vocational Bureau
203 Buckeye Bldg.

ATLANTA, GEORGIA
A. H. Benton
Personnel Service Co.
Mortgage Guarantee Bldg.

BALTIMORE, MARYLAND
H. C. Clodi
Personnel Service Co.
1005 Lexington Bldg.

BUFFALO, NEW YORK
E. F. Dean
Dean Employment Service
Brisbane Bldg.

CHICAGO, ILLINOIS
Bert L. Parsons
Consolidated Agencies, Inc.
209 South State Street

CINCINNATI, OHIO
E. A. Cost
Progressive Placement Service
306 Schmidt Bldg.

CLEVELAND, OHIO
T. G. Protheroe
A. R. Bradley
Technical Placement Service
504 Swetland Bldg.

COLUMBUS, OHIO
Harry C. Vaughn
Harry C. Vaughn & Associates
36th Floor, A.I.U. Bldg.

DALLAS, TEXAS
E. M. & Claude Karr
Karr Employment Service
Republic Bank Bldg.

DAYTON, OHIO
Allen G. Banks
Banks-Mitchell Employment Service
304 Keith Bldg.

DENVER, COLORADO
B. L. Johnson
Business Men's Clearing House
Midland Savings Bldg.

DETROIT, MICHIGAN
George M. Millar
George M. Millar Employment Service
National Bank Bldg.

HARTFORD, CONNECTICUT
Emory L. Wolfe
Personnel Service Bureau, Inc.
720 Main Street

INDIANAPOLIS, INDIANA
Ancil T. Brown
Brown Efficiency Bureau
806 Guaranty Bldg.

KANSAS CITY, MISSOURI
T. DeWitt Hughes
Western Employment Counselors Assn., Inc.
707 Sharp Bldg.

LOS ANGELES, CALIFORNIA
Fred M. Smith
Pacific Audit & System Co., Inc.
711 Story Bldg.

MEMPHIS, TENNESSEE
Shapiro Positions Exchange
Union Planters Bank Bldg.

MILWAUKEE, WISCONSIN
R. J. Willetts
National Clerical Bureau
6069 Plankinton Bldg.

MINNEAPOLIS, MINNESOTA
W. A. Gilman
James Ells Service
929 Plymouth Bldg.

NASHVILLE, TENNESSEE
Murray E. Hill
Murray E. Hill & Associates
Third National Bank Bldg.

NEW ORLEANS, LOUISIANA
O. P. West
Commercial Employment Agency
713 Canal Bank Bldg.

NEW YORK, NEW YORK
Albert H. Rohrer
Acorn Employment Service, Inc.
63 Park Row

OAKLAND, CALIFORNIA
Harry B. Smith
Pacific Audit & System Co., Inc.
1419 Broadway

OMAHA, NEBRASKA
Harry H. Knapp
Western Reference & Bond Assn.
834 Redick Tower

PEORIA, ILLINOIS
Harold S. Taes
Taes Employment Agency
405 Main Street

PHILADELPHIA, PA.
J. D. Stephens
Business Service Co.
1600 Walnut Street

PITTSBURGH, PA.
E. C. Coby
Coby Service Bureau
Bessemer Bldg.

SAN ANTONIO, TEXAS
George T. Ferris
George T. Ferris Service
210 Gunter Office Bldg.

SAN FRANCISCO, CALIF.
Harry B. Smith
Pacific Audit & System Co., Inc.
57 Post Street

ST. LOUIS, MISSOURI
E. T. Hasselbring
Business Service Co.
16th Floor, Chemical Bldg.

SYRACUSE, NEW YORK
R. E. Taylor
Taylor Employment
333 South Warren St.

TOLEDO, OHIO
E. Siefke
Toledo Personal Service Co.
1125 Edison Bldg.

WASHINGTON, D. C.
A. C. Wright
Boyd Employment Service
1333 F. Street, N. W.

Presidential Nights Come Two in a Row In Rhode Island; Gill and Woodside Visit

By Walter M. Saunders, Jr.

Rhode Island Chapter—Presidential nights are usually a rare occurence in Rhode Island, but for the first two successive meetings this year, official visits of Retiring President Woodside and President-Elect James P. Gill, Vanadium-Alloys Steel Co., have been featured.

It isn't often that the Chapter has the opportunity of seeing one president during his term of office, and when two appear in one year, and in succession, something should be done to commemorate the event.

On Nov. 1 Mr. Gill made his first official appearance as A.S.M. president before any chapter, when he spoke on "High Speed Steels".

His talk was well planned and progressed logically from brief remarks about importance of melting and forging practice as affecting the segregate in high speed steel to the properties of various common compositions, and the importance of considering how furnace atmospheres affect these properties.

He listed by slides 15 common compositions, and stated that hundreds of others could be made, all of which might offer some sales appeal, but which he felt should be submitted to exhaustive tests before the expense of their production could be justified.

Fortunately Robert E. Rose, Vanadium-Alloys Steel Co., a former member of the Pittsburgh and Springfield Chapters, and now a standby of the Boston Chapter, was present at the meeting, and ably described the work on tempering of high speed steels which Dr. Morris Cohen of M.I.T. presented at the recent A.S.M. convention.

In a return engagement as a coffee speaker at the dinner preceding the meeting, J. H. Pasell, Morse Twist Drill and Machine Co., spoke on "Modern Trends in Fire Fighting Apparatus", using an excellent working model he and his father had constructed to demonstrate how more efficiency in fighting fires might be obtained. It seems like a far cry from "Bee Keeping" the subject of his talk last year, to "Fire Eating", but in both hobbies Mr. Pasell has shown his Yankee ingenuity.

R. H. Harrington Describes Double Aging Treatment

By W. J. Resiner

Milwaukee Chapter — "Precipitation Hardening" was the subject of the talk given by Dr. R. H. Harrington at the second meeting of the year on Oct. 31.

Dr. Harrington, research metallurgist for the General Electric Co., first clearly explained the fundamental concepts of precipitation hardening and then developed in detail the role of strain and a double aging treatment with which he is thoroughly familiar.

The coffee talk was given by R. G. Stephenson on "The Metallurgical and Other Aspects of Silver Fox Production". Excellent color movies sketched in detail the life of a silver fox from pup to Milady's back. (No samples were given however.)

HELP WANTED

Address answers care of A. S. M., 7016 Euclid Ave., Cleveland, unless otherwise stated.

SALES REPRESENTATIVE: For New England territory, by leading manufacturer of electric heat treating furnaces. Please outline qualifications, and name other lines handled. Box 12-5.

RECENT GRADUATE, or one about to graduate, in chemical or metallurgical engineering, for well-known non-ferrous company. Work will consist in physical testing of materials, to be followed up by plant control work in the foundries. Send complete college record and information concerning personal qualifications and experience. Box 12-10.

MANUFACTURER'S REPRESENTATIVES or salesmen. Old established manufacturer starting a new line of equipment solicits men who have had sales or technical experience in tool steels, pyrometers, heat treating furnaces in Boston, New York, Philadelphia, Pittsburgh, Cleveland, St. Louis, Chicago or San Francisco. Replies will be strictly confidential. Box 12-25.

SALES ENGINEER: For control instrument manufacturer to do creative field sales work in applying recording instruments and automatic control equipment to processes and industrial operations in the steel works industry. Must have outstanding personality, initiative and aggressiveness; sound engineering education, mechanical, electrical, chemical or preferably metallurgical; also background of steel works experience including practical knowledge of means for accomplishing fuel economies and combustion control involved with heat treating furnaces, open hearth and soaking pits. Write stating age, education, experience and salary desired. Box 12-35.

METALLURGICAL ENGINEER: 40 to 45 years old; 12 to 20 years experience. Must be capable of organizing laboratory and directing both research and plant metallurgical work. Should be well versed in heat treatment and metallography, primarily of carbon and low alloy steels. Large manufacturer of finished parts doing their own melting, heat treating and finishing. Box 12-30.

A. S. M. Featured in Cleveland Newspapers

Under the title "Iron, Cleveland's Life Blood", a most interesting article appeared in the feature section of the Cleveland Plain Dealer for Nov. 26.

Of particular interest to members of the A.S.M. are several paragraphs referring to location of the Society's national headquarters in Cleveland.

"Because of Cleveland's prominence in the world of steel manufacture and fabrication, it is only natural that the industry's leading technical society should have national headquarters here", the article states, and continues with a general description of the Society's membership and functions under the direction of W. H. Eisenman, secretary, its publications and their editors, and the National Metal Exposition.

A prominent photograph and description of the Society's new home at 7301 Euclid Ave., to be occupied about Feb. 1, are also included in the article.

Van Horn's Address on Aluminum Correlates With Educational Course

By Randall J. Salzer

Rochester Chapter held its 182nd regular meeting at the University of Rochester on Nov. 13.

The dinner program included Fred M. Wilson, who was recently heard over the air in the "Hobby Lobby" program, and who represents the Better Business Bureau of Rochester. He gave an exposé of various schemes to fleece the public and exhibited a variety of amusing gadgets and fake contrivances with the warning "Investigate before you invest".

The technical address of the evening on "Aluminum and Its Alloys" was given by Dr. Kent Van Horn of the Aluminum Co. of America.

He included in his lecture the microstructure, physical properties, and commercial applications of the various aluminum alloys. This correlated with the educational course now under way in the Rochester Chapter.

Dr. Van Horn's unique presentation of "physical curves" as a means to better interpret "age hardening" created considerable interest.

The talk was concluded with a statement to the effect that the ultimate in physical properties of aluminum alloys has not been exhausted, and that in the future we can expect to hear of workable alloys having physical properties in excess of those which we now use.

Gas Evolution Is Studied in Rimming Steel

Chipman Presents Involved Technical Subject in Forceful Manner at Detroit

By Walter G. Patton

Detroit Chapter inaugurated its 1939-40 technical sessions at the Fort Shelby on Nov. 13, with a talk by Dr. John Chipman on "Gas Evolution and Segregation in Rimming Steel" that may well establish a high standard of technical excellence for the year.

Winner (in 1934) of the Howe Medal for a paper on the deoxidation of steel, Dr. Chipman indicated by the clarity of his approach to the subject, his frequent references to researches in which he has engaged personally at the University of Michigan, American Rolling Mill and, presently, Massachusetts Institute of Technology, that he not only has a sound understanding of the problem of gas evolution and segregation but that he has also marked ability at presenting an involved technical subject in a forceful manner.

Qualities Required in Rimming Steel

In introducing his subject, Dr. Chipman pointed out that the outstanding qualities required in rimming steel are superior surface quality, good forming characteristics and freedom from structural defects. These results, he continued, must be obtained without the friendly services of hot tops and without addition of alloys such as aluminum which are frequently resorted to in killed steel practice.

During the rather violent evolution of gas that continues for 20 to 25 min. after pouring rimming steel, the volume of gas evolved is constantly changing, and the composition of the metal likewise varies as carbon and oxygen escape into the air. The end result of these phenomena, Dr. Chipman observed, is what is commonly known as segregation.

To the expert melter, the appearance of the metal as the heat is poured offers a convenient "rule-of-thumb" which can be translated directly into a reliable check on open-hearth operation.

In order to study better the segregation phenomena in rimming steel, Dr. Chipman blew a number of ingots apart with dynamite charges, thus strikingly revealing the nature and position of the primary and secondary blowholes and their characteristic habits of forming in the lower part of the ingot at a fairly uniform distance from the skin. Later, a sulphur print of the ingot was made to disclose the location of high sulphur concentration.

In discussing blowholes, Dr. Chipman traced a number of experiments performed in his laboratory and by other investigators covering gas and ingot analysis which have resulted in the development of useful gas evolution charts and rate-of-solidification curves.

Gas Evolution Calculated

According to Dr. Chipman's calculations, about 87% of the gas evolved from a certain rimming steel ingot was CO, the remaining 13% being CO_2, H_2, N_2 and CH_4. It is also interesting to note that in one study it was computed that only one part of gas in 137, or considerably less than 1%, was retained in the ingot after solidification.

The speaker observed that his studies indicate quite clearly that the amount of solidification is, at any instant, proportional to the amount of gas being evolved at that time.

As a result of careful research by Dr. Chipman and others, it has been computed that the greatest tendencies to segregation may be attributed to S, C, O_2, P and Cu and that the stirring action taking place in the ingot as it cools tends to break up these concentrations, mixing the segregate with the liquid steel.

In summarizing his discussion of segregation, Dr. Chipman listed the following factors as perhaps the most significant:

1. Differential freezing.
2. Formation of enriched film between the liquid and solidified metal.
3. Mixing of film with bulk of liquid metal.
4. Entrapment of part of film in solidified metal.
5. Loss of carbon and oxygen as gas.
6. Non-metallic material floating to the top of the ingot.

The speaker's concluding remarks concerning the mechanism of blowhole formation were illustrated with slides based upon the recent work of Hultgren and Phragmen in Sweden which showed rather conclusively the tell-tale marks of blowholes which had filled during the freezing process.

Preceding Dr. Chipman's address, Charles E. Dorais, head football coach at the University of Detroit and surviving member of the famed Rockne-Dorais passing combination that confounded a great Army team back in 1910 and started the forward pass on its way to high favor as an offensive football weapon, gave a coffee talk in which he traced in a most entertaining manner the history and development of football in this country in the early days.

St. Louis Course Meets With Unexpected Success

St. Louis Chapter reports that the fall educational course—the Bates lectures on "Fundamentals of Ferrous Metallurgy"—is meeting with unexpected success.

In view of the limited development of blast furnaces and steel mills in that territory compared to such centers as Cleveland, Pittsburgh and Chicago, the maximum attendance was expected to be about 50. However, 130 registered for the course!

Lecturers are F. X. Hahn, chief chemist of Scullin Steel Co., M. E. Meyerson of St. Louis Testing Laboratories, Inc., and C. B. Swander, chief metallurgist of Wagner Electric Corp. The Laclede Gas Light Co. has generously donated the use of their auditorium.

The Educational Committee consists of William J. Harris, Jr., Laclede Gas Light Co., and George J. Moeller, Dazey Churn & Mfg. Co.

Demand Continues for Furnace That Will Not Alter Surface of Material Treated

Cincinnati Chapter* — Decarburization or unwanted carburization of steel is a source of expense and trouble, hence the demand has been and continues to be for a furnace that will do the work required without seriously altering the surface appearance or composition of the material being treated. So stated B. W. Gonser, supervising metallurgist, Battelle Memorial Institute, Columbus, Ohio, who addressed the meeting on Oct. 12.

Dr. Gonser's talk on "Furnace Atmospheres" was preceded by a buffet luncheon and a movie, "The Picturesque West", furnished by the Canadian Pacific Railroad.

Several means are available for the prevention of scaling, carburization, or decarburization of steel when it is heated. They include:

1. Heating in absence of any gas or mechanically protecting the surface.
2. Using an inert gas like pure nitrogen or helium.
3. Adding small amounts of a reactive gas as carbon monoxide or hydrogen to overcome the bad effects of impurities in commercial nitrogen.
4. Using cracked ammonia or similar high hydrogen gas.
5. Using a charcoal generator gas or one high in carbon monoxide.
6. Using partly burned natural or city gas, propane, butane, and the like, after removing undesirable constituents.
7. Using any of various protective special gases.

Complex Reactions Involved

Advantages and disadvantages of these various means as applied to steel were discussed and the complexity of the reactions involved was emphasized. It was shown that most atmospheres commercially used consist of gas mixtures which are not in complete equilibrium in contact with a heated steel surface, hence react to oxidize, carburize, or decarburize to some extent.

From a study of the behavior of relatively simple gases, such as dry nitrogen plus carbon monoxide or hydrogen, a better understanding has been obtained of the various complex reactions that take place when steel is heated in mixed gases. Results of these tests made at Battelle showed particularly the necessity of eliminating carbon dioxide, as well as free oxygen and water vapor, in order to prevent decarburization of steel.

Addition of a little methane or natural gas to atmospheres containing hydrogen or a very slight amount of water vapor may counteract the decarburizing tendencies of such a mixed gas but is not effective in the presence of considerable moisture.

With a few exceptions the effect of various gas compositions is practically the same on low alloy steels as it is on plain carbon steels, since the carbon content is the determining factor. Chromium steels are easily stained, however, even by carbon monoxide.

Silicon containing steels resist carburization or decarburization more than do plain carbon steels, and nickel steels appear to retain their bright appearance somewhat better than the plain carbon.

In concluding, Dr. Gonser described some of the equipment available for producing controlled atmospheres and called attention to the recent trend in using partially burned natural or artificial gas from which both moisture and carbon dioxide have been removed.

He commented on the desirability of developing simple equipment for relatively small scale or periodic operations and of obtaining a commercially effective way of mechanically protecting the surface of miscellaneous metal products which are heat treated in direct fired gas furnaces.

The talk was well illustrated by slides showing the effect of various gas reactions at metal surfaces.

**Report prepared by collaboration of Ned Wingerter, B. W. Gonser and Kurt Siems.*

Men Most Important Heat Treating 'Tools'

By Anthony C. Kowalski

Worcester Chapter featured Heat Treating Night on Nov. 15, with M. O. Snyder, heat treatment superintendent of the Watertown Arsenal, as the speaker. He emphasized the fact that heat treatment is an art and not a science.

The "tools" for proper heat treatment in the order of their importance were listed as men, furnaces and accessories.

Men are the most important, for they make the difference between good and bad results regardless of other conditions. Furnaces should be designed for the particular type of work they are to be used for.

The only way to produce uniform results is to have uniform temperatures. This is accomplished by good pyrometer practice and proper furnace loading.

In discussing forgings, Mr. Snyder declared that the method of making the forgings has an important bearing on the subsequent heat treating operations. One blow too many or one blow too few on the hammer, or a finishing temperature 50° too high or 50° too low, will sometimes cause an excessive amount of deformation in heat treatment of the forging.

Charles A. Warren, patent attorney, was coffee speaker, and divulged useful information on how to safeguard patentable ideas.

Officers of Hartford Chapter A. S. M.

The Hartford Times Is Responsible for This Smiling Photograph of the Officers of the Hartford Chapter. Left to right, they are D. J. O'Neil, Carpenter Steel Co., vice-chairman; C. J. Umlauf, Union Drawn Steel Division, chairman; and W. E. Bancroft, Pratt & Whitney, secretary-treasurer.

Penn State Holds 'Mets Mixer'

By John Conte

Penn State Chapter—An all-metallurgical interclass student and faculty party was held on Oct. 26 for the purpose of getting acquainted. Over 100 of the 130 undergraduate metallurgists attended in spite of the threat of "blue-books" and other scholastic difficulties.

Refreshments, speeches, stories, and stunts, followed by the feats of a student magician, furnished entertainment for the evening.

Helpful Literature — Mail Coupon Below

Recording Control Equipment
Now available from Baldwin-Southwark Corp. is a new 16-page bulletin illustrating and describing Southwark's complete line of stress-strain recorders and extensometers. Bulletin Bc-67.

Micro-Optical Pyrometers
A new instrument which permits measuring the temperatures of very small objects such as incandescent lamp filaments, etc., and for laboratory and scientific research work has been developed by the Pyrometer Instrument Co. Bulletin Kc-37.

Core Baking Ovens
Helpful facts for producing better cores for the foundry are contained in an attractive 8-page folder printed by The Paul Maehler Co. Bulletin Kc-159.

Vapocarb-Hump
Vapocarb-Hump, the triple-control method for heat treatment of steel, is described in a 36-page catalog issued by Leeds & Northrup Co., in which a special effort has been made to show how this method gives complete control of tool surface, shape and structure. Bulletin Cb-46.

Annealing Furnace
The interesting "Top Hat" Cover Annealing furnace just perfected by Continental Industrial Engineers, Inc., is described in a bulletin of value to furnace users. Bulletin Nc-154.

Welding Stainless Steels
A 24-page technical bulletin, giving important information for the engineer, designer or welding operator on the welding of stainless steel, is available through the Arcos Corp. Bulletin Hc-191.

Atmosphere Control
A device manufactured by Brown Instrument Co. and known as the "Analy-Graph" records minute changes in the chemical composition of a furnace atmosphere. How it works is told in Bulletin Ka-3.

Tube Alloys
Practical data on tube alloys compiled by the Technical Department of the Driver-Harris Co. simplifies calculations by providing derived constants in the shape of tables and formulae. Handy conversion tables included. Bulletin Ib-19.

Testing and Controls
An up-to-the-minute booklet on foundry sand testing and control equipment is just off the press. Published by Harry W. Dietert Co. Bulletin Ec-198.

Machining Steel
An 80-page book of general and specific information on steels, including tables of recommended cutting speeds and feeds for many grades of carbon, alloy and stainless steel, has been made available by the Union Drawn Steel Division of Republic Steel Corp. Bulletin Nc-8.

Arc-Welding Electrodes
A very helpful 40-page booklet for arc-welders and those interested in welding in general has been made available by the General Electric Co. Bulletin Nc-60.

General Data Book
Valuable reference and data are contained in a book by Joseph T. Ryerson & Son, Inc., which gives metallurgical definitions, heat, hardness, and numerical equivalent tables as well as many valuable operating facts. Bulletin Nc-106.

Design
Designing greater sales appeal into products is explained in a colorful 8-page booklet for anyone who contemplates using, or is using, Stainless Steel, issued by the Carpenter Steel Co. Bulletin Nc-12.

Heat Treating Line
An attractive catalog of heat treating products is published by Park Chemical Co. It starts out with a very useful diagrammatic thermometer showing the temperature and ranges for various heat treating, melting and other processes requiring heat. Bulletin Oy-141.

Portable Potentiometer
An extremely versatile indicating potentiometer with precise balancing, quick standardization, and easy-reading scales is described and illustrated in a new folder by the Foxboro Co. Bulletin Nc-21.

Hardening Furnace
A new pamphlet which describes "Certain Curtain" furnaces made by C. I. Hayes, Inc., will be particularly interesting to those with hardening problems. Bulletin Nc-15.

Closer Temperatures
Closer temperature control than is possible with any Mechanical Controller is explained in a 12-page illustrated pamphlet just released by Wheelco Instruments Co. Bulletin Nc-110.

Degreasers
An interesting line of portable degreasers which can be taken to the work—instead of bringing work to the degreaser—is shown and described in a colorful folder by the Phillips Manufacturing Co. Bulletin Nc-254.

Testing Catalog
A loose-leaf binder provides a handy reference catalog of testing machines made by Steel City Testing Laboratory. Universal hydraulic machines, Brinell testers, bend, impact, tensile, and ductility testers are some of the products. Bulletin Oy-140.

Bright Annealing
Various types of electric and fuel-fired furnaces built by the Electric Furnace Co. for bright-annealing wire, tubing, strip and other products are described in an 8-page folder. Bulletin Lb-30.

Burner Economy
Interesting photographs and text are used by Surface Combustion Corp. to show that a choice of 47 different types and more than 400 different sizes is sure to give economy in operation. Bulletin Ca-51.

Cinch Steel Cement
How Cinch steel cement saves high speed steel and Stellite by permitting the using up of short pieces is told in a bulletin by Claud S. Gordon Co. Bulletin Ka-53.

Chapmanizing
Chapmanizing, the method of surface hardening steel with nitrogen, is described in a very attractive booklet of Chapman Valve Mfg. Co. Information is given on the method itself and on its metallurgical advantages. Bulletin Ob-80.

Welding Pipe Lines
An improved welding method used in the construction of over 5000 miles of cross-country pipe lines is discussed in a 32-page illustrated booklet published by The Linde Air Products Co. Bulletin Da-63.

High Tensile
The 19 advantages that USS Cor-Ten steel offers to railroads and other industries are attractively presented in a 68-page book on this new low cost, high tensile steel published by United States Steel Corp. Bulletin Ka-79.

Brazing Alloy
Sil-Fos for joining brass, bronze, nickel, nickel silver, extruding brass and bronze, monel metal and other non-ferrous metals and alloys fusing above 1300° F. is a product of Handy & Harman, described in Bulletin Jy-126.

Screw Machining
Screw machine products of aluminum are treated in authoritative and extensive manner in a booklet of Aluminum Co. of America. Besides general data on screw machining, a number of very useful tables appear. Bulletin Ar-54.

Electromet Review
A very attractive house organ which gives news and views of alloy steels and irons, but is mostly concerned with stainless steels. Electro Metallurgical Co. publishes it. Bulletin Ox-16.

Galvanizing
An informative, historical, simple digest of galvanizing forms a guide to longer life for iron and steel products. This handsome, handy, 24-page book beautifully printed in color is distributed by American Hot Dip Galvanizers Association, Inc. Bulletin Ea-167.

Ingot Production
"The Ingot Phase of Steel Production" is the title of a book defining the principles of quality ingot production followed by many well-known steel manufacturers. Gathmann Engineering Co. Bulletin Ka-13.

Lectrodryer
A machine designed specifically for the dehumidification of air and other gases as well as certain liquids—the "Lectrodryer"—is pictured and explained in a booklet by the Pittsburgh Lectrodryer Corp. Bulletin Gc-187.

Heat Resisting Alloys
Authoritative information on alloy castings, especially the chromium-nickel and straight chromium alloys manufactured by General Alloys Co. to resist corrosion and high temperatures, is contained in Bulletin D-17.

Electric Furnaces
A new catalog on electric furnaces and pyrometers has been released by the Hoskins Manufacturing Company. For anyone who does any kind of heat-treating, brazing, or uses heat-resisting castings. Bulletin Hc-24.

Hardened Gearing
Extremely valuable technical information on heat treated hardened gearing, including treatment, control and quenching, comparison of properties, etc., is included in a booklet by the Westinghouse Electric & Mfg. Co. Bulletin Hc-134.

Pure Metals
Pure, carbide-free metals are described and applications suggested in a pamphlet published by Metal & Thermit Corp., who make pure tungsten, chromium and manganese in addition to the ferro-alloys. Bulletin Ma-64.

Heat Treat Chart
Heat treaters everywhere should find a heat treating wall chart complete with S.A.E. specifications a very valuable addition to their shops. Published by Chicago Flexible Shaft Co., manufacturers of Stuart industrial furnaces. Bulletin Ka-49.

Heroult Furnace
Revised and expanded to include modern major innovations in the construction and operation of the Heroult electric furnace, the latest edition of the American Bridge Co.'s Heroult Electric Furnace Bulletin is available. Bulletin Bb-124.

Moly Matrix
Climax Molybdenum Co.'s little monthly newspaper contains many interesting and informative articles. Get the latest issue—Bulletin Ax-4.

Seamless Tubes
Prepared by the Timken Steel and Tube Division of Timken Roller Bearing Co. is a "Guide for Users of High Temperature Steels," which presents technical data relating to the various properties of Timken seamless tubes. Bulletin Bb-71.

Mo-W High Speed
J. V. Emmons, metallurgist for Cleveland Twist Drill Co. and largely responsible for the development of the molybdenum-tungsten high speed steels known as Mo-Max, has prepared a general description of these new steels. Bulletin Ka-103.

Ni-Cr Castings
Compositions, properties, and uses of the high nickel-chromium castings made by The Electro Alloys Co. for heat, corrosion and abrasion resistance are concisely stated in a handy illustrated booklet. Bulletin Fx-32.

Cadalyte "39"
A new technical service manual on CADALYTE "39" for cadmium plating has been issued by the Electroplating Division of Du Pont. Cites recent improvements and changes in the product, and gives detailed operating instructions and methods of analyses. A table of costs and time required for specified deposits is inclued. Bulletin Gb-29.

Tellurium Coppers
A comparison of Chase Tellurium Coppers with other alloys is contained in a new folder published by the Chase Brass & Copper Co. Bulletin Kc-59.

Annual Index
The Annual Index of the Copper Alloy Bulletin published regularly by the Bridgeport Brass Company is now made available through this company. Bulletin Kc-163.

Low-Alloy Steel
A new folder on Mayari R, Bethlehem's high-strength, corrosion resisting steel, is colorfully illustrated with views of its various uses. Bulletin Kc-76.

Hardness Testing
A 4-page folder which has as its purpose "to give you an idea of how practical a thing it is to make hardness tests on raw stock or fabricated metal parts in all plants where metal is worked, and to suggest something of the necessity for making such tests, or at least their importance" is available through the Wilson Mechanical Instrument Co., Inc. Bulletin Fb-22.

Lubrication
Intensive research which completed important improvements in the field of heavy-duty gear and bearing lubrication is tabulated in a new 12-page illustrated bulletin just released by D. A. Stuart Oil Co., Ltd. Bulletin Lb-118.

Defi Rust
Analysis and descriptive notes of nine types of heat and corrosion resisting steels made by Rustless Iron and Steel Co. are contained in a handsome folder. Bulletin Ha-169.

Carburizing Salt
A technical service bulletin describing a new development—DuPont Carburizing Salt—for the economical production of deep high-carbon cases on plain carbon and alloy carburizing steels . . . available through DuPont. Bulletin Dc-29.

Stainless Data Book
All users of stainless and heat resisting alloys should find invaluable the information contained in a booklet published by Maurath, Inc., giving complete analyses of the alloys produced by the different manufacturers, along with the proper electrodes for welding each of them. Bulletin Jy-125.

Portable Hardness Tester
The "Telebrineller" is described in a new bulletin as a simple, rugged, flexible instrument that accurately determines Brinell hardness of surfaces and objects inaccessible to conventional testers. Total weight, 6½ lbs. Teleweld, Inc. Bulletin Dc-98.

Colmonoy
The high resistance to wear and corrosion which distinguishes Colmonoy alloys and overlay metals is explained in a 4-page catalog released by Wall-Colmonoy Corp. Bulletin Bc-85.

Oil Burners
North American Mfg. Co. offers a bulletin describing improved low pressure oil burners, one type especially designed for automatic control and ideally suited for use with proportioning control valves. Bulletin Na-138.

Hydryzing
Hydryzed work is completely described in recent literature released by Lindberg Engineering Co. Points out advantages in particular applications. Bulletin Bc-66.

Dust Control
Dust control in the plant is as important as dust control on the prairies, American Foundry Equipment Co. points out in a booklet describing their "Dustube" dust collectors. Bulletin Id-112.

Bessemer Steel
Jones & Laughlin Steel Corp. has for distribution reprints of the paper by C. C. Henning on "Manufacture and Properties of Bessemer Steel" that received the Robert W. Hunt Award of the A.I.M.E. Bulletin Ca-50.

Globar Elements
Globar Pin Type Non-Metallic Electric Heating Elements and Terminal Rods and Globar "AT" Type Non-Metallic Electric Heating Elements are explained and illustrated in two recent booklets issued by the Globar Division of the Carborundum Company. Bulletin Lb-25.

Cutting Oils
An interesting new booklet "Metal Cutting Lubrication—In Theory and Practice" has just been made available by Cities Service Oil Co. Bulletin Ec-113.

Direct Reading Brinell
Production testing on parts of any shape without spotting or the use of a microscope is possible through the new Direct Reading Brinell machine described in a folder by the Detroit Testing Machine Co. Bulletin Gc-245.

Wide-Strip Pyrometer
Complete information on the new Bristol Multiple Record Wide-Strip Pyrometer can be obtained through the Bristol Company. Gives up to 8 temperature records on the same chart. Bulletin Ac-87.

Foundry Sand
A pamphlet recently issued on TAM Foundry Zircon Sand and TAM Zircon Flour contains detailed information on these products of the Titanium Alloy Mfg. Co. Bulletin Hc-90.

Metallographic Reference
Nearly one thousand technical books and reference papers on Optical Principles in Metallography are listed in the new Metal Analyst just released by Adolph I. Buehler. Bulletin Lc-135.

Contour Metal Shaping
A very colorful, plastic-bound booklet containing Job Sheets on metal shaping jobs will be helpful to men in Shipbuilding, Plastics, Silverware and Automotive fields. Available through Continental Machines, Inc. Bulletin Lc-170.

Compressor Data
General information on the application of blowers to gas and oil burners, and miscellaneous applications for other types of work are included in a 12-page "Turbo Compressor Data Book." Useful tables and charts are included. Spencer Turbine Co. Bulletin Dy-70.

Controlled Combustion
Direct Fired Air Heaters which make possible Controlled Combustion and permit wider range in oven and furnace operation are explained in a 4-page folder by the Despatch Oven Co. Bulletin Lc-123.

Burners
New and up-to-date bulletins by Eclipse Fuel Engineering Co. covering many types of burners as well as their complete listing of products are now available. Bulletin Lc-226.

Tremendous Trifles
Another of International Nickel's instructive folders on Monel Metal covering actual case studies of the use of Monel is now available. Bulletin Lc-45.

Optical Pyrometer
The first industrial Optical Pyrometer to use the potentiometer method of measurement is featured in an interesting and instructive booklet published by Leeds & Northrup Co. Bulletin Lc-46.

Tocco Process
The marvel of all heat treaters—the Tocco Process of Induction Hardening—is fully described in a colorful folder by the Ohio Crankshaft Co. Bulletin Lc-145.

Machining Data
A new chart giving the correct grade of Kennametal for machining 21 types of metals, with recommended cutting speeds, has just been made available by McKenna Metals Co. Bulletin Lc-238.

More Dust Hog
Those who have been following the Dust Hog series of the Pangborn Corp., which analyzes the cost of dust to industry, will appreciate the fifth and sixth folders of the series which are now available. Bulletin Lc-68.

The Review
7016 Euclid Ave., Cleveland

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			Lc-68

HERE AND THERE WITH A.S.M. MEMBERS

HAROLD J. STEIN, a charter member of the Milwaukee Chapter and research engineer of the manufacturing department, Allis-Chalmers Mfg. Co., has been appointed director of research, chemistry and metallurgy.

H. J. Stein

Mr. Stein joined Allis-Chalmers in 1916, and has been successively foreman of the tractor heat treating department, general foreman of the heat treating department, assistant superintendent of the forge department, and assistant research engineer of the manufacturing department. He was made chief research engineer in 1936.

His assistant will be J. T. JARMAN, also a member of the A.S.M. W. A. HAMBLEY has been made metallurgist in the gray iron foundry, and ARTHUR K. HIGGINS metallurgist of the nonferrous foundry.

STEVENS Institute of Technology has announced the organization of a division in powder metallurgy, and the appointment to its faculty of GREGORY J. COMSTOCK as associate professor of powder metallurgy, and CLAIRE C. BALKE as assistant professor of powder metallurgy.

Professor Comstock, a graduate of Sheffield Scientific School, was employed successively as metallurgist with the American Hardware Corp., metallurgist and manager of experimental factory for the International Silver Co., director of research with Firth-Sterling Steel Co., and more recently as consultant in powder metallurgy and manager of metal powder products division for Handy & Harman.

Professor Balke for a number of years has been conducting research on the preparation, properties, and uses of metallic powders, principally those of the refractory metals, in the laboratory of Fansteel Metallurgical Corp.

Two evening courses in the new division will be offered at Stevens during the second semester beginning Feb. 5.

NAMED executive vice-president of the Copperweld Steel Co., FREDERICK J. GRIFFITHS will be in charge of the company's new alloy steel plant in Warren, Ohio.

F. J. Griffiths

One of the nation's outstanding pioneers in the development of alloy steels, an accomplished metallurgist, and an executive of proved ability, Mr. Griffiths has held such positions as president of Timken Steel & Tube Co., member of the board of Republic Steel Corp., president of Republic Research Corp., and chairman of the board of Central Alloy Steel Corp. For the past three years he has been president of Griffiths-Bowman Engineering Co.

Mr. Griffiths at present holds directorships in Eaton Mfg. Co., Cleveland Graphite Bronze Co., Inland Investors, Inc., and Aetna-Standard Engineering Co. of Youngstown.

HENRY D. PHILLIPS, formerly chief metallurgist and general superintendent, Dodge Steel Co., Philadelphia, has been made product engineer of the Lebanon Steel Foundry, Lebanon, Pa.

Mr. Phillips has been associated with the steel casting industry since leaving the University of Pennsylvania in 1928. His first position was as steel foundry superintendent for Stockham Pipe Fitting Co. of Birmingham, Ala.

He is a member of the A.S.M., the A.I.M.E., the A.F.A., and the British Iron and Steel Institute.

DIED

RALPH STEWART MACPHERRAN, former chief chemist, Allis-Chalmers Mfg. Co., Milwaukee, and one of the outstanding metallurgists in the field of gray cast iron, on Nov. 13. Mr. MacPherran was 68 years old and just recently had retired after 44 years service with the firm.

Educated at University of Wisconsin and University of Michigan, Mr. MacPherran spent three years at Illinois Steel Corp. before joining the E. P. Allis Co. of Milwaukee in 1895. In 1907 he spent one year with the J. L. Case Threshing Machine Co., and then returned to the newly formed Allis-Chalmers Mfg. Co. He had been associated with that organization ever since in charge of its chemical and physical laboratories.

Contributor of numerous technical papers on metallurgy of gray iron and steel, he was awarded the J. H. Whiting gold medal by the American Foundrymen's Association in 1931. He was a member of the A.S.M., A.F.A., A.S.T.M., International Society for Testing Materials, and American Chemical Society.

Hardenability Definition Is Elusive, but Concept Is Widening in Application

By Fred P. Peters

New Jersey Chapter—One Marcus A. Grossmann, Sc.D., director of research of Carnegie-Illinois Steel Corp., knows very little about grain size and practically nothing about hardenability—at least that was his opinion before he presented a lecture on "Grain Size and Hardenability" on Nov. 20.

Some 200 members and guests now know a lot about grain size and practically everything about hardenability—at least that is their opinion after absorbing Dr. Grossmann's information on those subjects. Unfortunately their opinion of the speaker's veracity concerning his own knowledge must be omitted from the public prints.

Dr. Grossmann first gave a clear exposition of the meaning of austenite grain size and the mechanism of grain-coarsening. The dependence of austenite grain size of a given piece of steel on the *temperature* of final heating was stressed, and slides were used to demonstrate the steps by which the austenite grain size at one temperature may become a larger austenite grain size at a higher temperature.

It is the extent of this grain-coarsening tendency of a piece of steel that people really mean when they speak of high or low "inherent" grain size.

It is well known that a steel that reveals a coarse austenite grain structure after heating to a certain temperature will have higher "hardenability" than a steel of similar composition that develops a fine grain after heating.

Difficult to define generally, the concept of hardenability nevertheless is capable of simple evaluation and applicability. In simplest terms, "hardenability" refers to the *extent* of hardening that a steel will undergo when rapidly cooled to room temperature from above its critical range.

Dr. Grossmann stressed the difference between *hardenability* and *maximum hardness attainable*. Thus, the addition of carbon to a steel increases the maximum hardness attainable through the general hardening effect on the matrix; alloying elements increase the hardenability—that is, they increase the penetration of hardening from the surface toward the interior when rapidly cooled, through their retarding effect on austenite decomposition.

Many methods and systems of providing information on hardenability have been proposed. But whatever test is used, it is found that all of the methods reveal one behavior in common: If one plots the hardness against cooling time, then in every steel the high hardness attainable at short cooling times (rapid quenching) drops at first slowly with increased cooling time, then within a narrow range of cooling times it drops rapidly, and thereafter drops only slowly with still longer cooling times.

Dr. Grossmann showed that the same behavior is revealed when plotting the center hardness of different sized bars of a given steel, quenched by standardized procedure, against bar diameter. A useful hardenability rating can then be obtained by locating that bar diameter that corresponds to the steepest part of the curve.

This bar diameter he calls the "critical size", for it actually is the largest size of bar of that steel that will have a center hardness not much lower than the surface—or in other words, that will practically harden throughout.

Additional sets of curves for various steels and quench-severities permit estimation of the "critical size" for a given new lot of steel after determining the ratio of the unhardened core to the total cross-sectional area of a quenched piece of that steel of any single available size.

Such curves also allow the user to select the best quench-severity from a knowledge of the "critical size" of the steel and the actual size of the piece to be heat treated.

Complicated? Maybe so here—but not the way Dr. Grossmann tells it!

Windowless Factory Visited

(Continued from page 1)

ature of the brine is controlled to prevent quenching cracks at the base of the teeth. Files are quenched vertically in brine and then transferred and clamped in fixtures under the brine to complete the quench and maintain straightness.

They are cleaned by sandblasting. Final operation is 100% inspection by file provers, using test pieces with hardness ranges corresponding to the hardness of the material on which the different files are used.

Three Avenues of Attack Outlined to Study Machinability

By G. G. Wilcox

Hartford Chapter has had nineteen chairmen since 1920, and twelve of them were present and received suitable recognition from the Society at the dinner given on Past Chairmen's Night on Nov. 14.

The subject of the evening was "Mechanical Properties and Machinability of Lead Bearing Steels", ably presented by National Vice-President Oscar E. Harder.

The speaker said the general problem of machinability was open to attack by three avenues: First, an attempt to improve the design and materials of tools; second, improvements in lubricants and cutting compounds; third, increasing the machinability of the steel itself. The third method was the only one discussed.

Lead Additions Successful

Efforts have been made in the past to improve machinability by introducing into the steel various specific elements or compounds. Unfortunately, practically all additions of this sort up to now have resulted in lowering the physical properties of the steel.

A comparatively recent step in this direction is the addition of lead. On the basis of technical literature, lead is insoluble in either molten or solid steel, and the problem of incorporating the lead with the steel is one of obtaining a very fine, uniform dispersion of lead particles throughout.

The first experimental success was achieved by the use of electric induction melting. Since the process has been put on a commercial basis, good results are obtained by regular open-hearth or electric furnace practice, the lead being added in the mold.

Chemical analysis from many points throughout the ingot show a good lead distribution, in a typical instance varying from 0.17% to 0.25%. Lead additions in practically all cases amount to 0.15 to 0.25%.

Many lantern slides of graphs and tables were exhibited to show the relative properties of various steels with or without lead. It was evident from the tests that no material change in physical properties takes place due to lead additions, but that in most cases a marked improvement in machinability is obtained.

The usual properties of hardness, tensile strength, elastic limit, and impact resistance were investigated, both longitudinal and transverse. Some endurance tests were also run and no bad effect was found due to lead additions.

Sawability tests on lead bearing steels showed improvement on the order of 20 to 40% over non-leaded steel of otherwise similar analysis and properties. Heat treated alloy steels machined with an ease approaching that of S.A.E. X1112, although they are much harder.

Microstructure Is Finer Grained

The microstructure of Ledloy, the trade name for this class of steels, differs in no appreciable extent from that of non-lead-bearing steels, except that the grain size is generally slightly finer. As may be expected from this, carburized Ledloy steels are somewhat finer grained in case and in core.

In machining, a finer finish is obtained with lead treated steels. Physical properties are not affected by the structural condition of the steel, whether hot rolled, cold drawn, or heat treated; whether low carbon, high carbon, or alloy steel.

In drilling tests, greater production and longer tool life were encountered. Many other machining tests of several kinds showed production improvements ranging up to 72%.

Leaded steels machine noticeably cooler, indicating that lead acts as a lubricant.

In the question period following the lecture, a number of additional points of specific interest were brought out. The meeting closed with an enthusiastic vote of appreciation to the speaker for an interesting and enlightening presentation of the subject.

Cupping Operations Make Tantalum Seamless Tubing

By Edward P. Epler

Calumet Chapter, on Nov. 21 took a moving picture trip from coast to coast by United Air Lines and made a three point landing in the Mainliner at the Woodmar Country Club just in time to hear Dr. Clarence Balke of Fansteel Metallurgical Corp. give his interesting talk on "Powder Metallurgy".

The portion of this talk covering the production and manufacture of tantalum powder was well reported in last month's REVIEW.

Calumet members, however, were particularly interested in the method used to produce seamless tubing from tantalum. Dr. Balke said that the tubes were formed through a series of cupping operations starting on a tantalum disk.

The high fusion point of this metal presented quite a problem in the welding of shapes, due to oxidation, but this was solved by welding in vacuum, under carbon tetrachloride or under water. Successful welds have been made in air by a rapid method of butt welding.

A number of very interesting slides were shown including a series of micrographs of the extremely hard carbides, the preparation of which must have caused Dr. Balke and his assistants considerable difficulty in cutting and polishing. These were shown at an original magnification of 1500 diameters which displayed excellent technique employed on an unusual and difficult metallographic problem.

Transactions Index Ready

An index to Vol. XXVII of TRANSACTIONS, *covering the four quarterly issues in 1939, has been prepared and is available to members of the Society at no charge on request to the national office, 7016 Euclid Ave., Cleveland.*

Fine Analysis of Motor Failures Is Given by Eddy

By W. J. Resiner

Milwaukee Chapter proclaimed Tuesday, Nov. 21 as its own private Thanksgiving Day, and thanks go to W. P. Eddy, Jr., metallurgical and service engineer, General Motors Truck & Coach Co., for as fine an analysis of service failures in motor vehicles as it has ever been our pleasure to hear.

Mr. Eddy, dividing the causes of failure into five parts, showed many slides of specific cases of each and detailed the illness and the cure.

The part played by faulty design or manufacture in common fatigue failures was clearly shown, and the difference between this type of failure and simple overstress was emphasized.

Lubrication is extremely important in the "wearing in" time as well as during the normal life of gear or part. The careless operator of the vehicle can also do considerable damage to parts of even the best design and manufacture, as several of the slides clearly brought out.

The dinner talk was given by H. L. Hinstorff of the Milwaukee Police Department, who gave a very good idea of what goes on behind the doors of the Safety Building when one of us steps off the straight and narrow.

Peoria Expands Program

Instead of having nine monthly meetings and two sets of educational lectures, Peoria Chapter has arranged this season to have 16 regular meetings with particularly outstanding speakers, according to M. D. Johnson, chairman of the Program Committee.

The last six meetings of the program, starting Feb. 12, will be based on the broad subject of "Inspection and Quality Control". It is felt that this will be a very valuable program concerning one of the most vital problems of industry today, and should complete a most outstanding year of accomplishment for the Chapter.

CHAPTER CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Jan. 22	Engineers Club	D. K. Crampton	Copper and Copper Alloys
Boston	Jan. 5	M.I.T. Room 6-120	Joseph Winlock	Sheet and Strip Steel for Deep Drawing
Buffalo	Jan. 11	Hotel Buffalo	R. C. Good	Open-Hearth Practice
Calumet	Jan. 16	Woodmar Country Club, Hammond, Ind.	John E. Angle	Production of Hot and Cold Rolled Sheet and Strip
Canton-Mass.	Jan. 11	Hotel Onesto	W. P. Woodside	Founders Night
Chicago	Jan. 11	Medinah Club	J. P. Gill	Recent Tool Steel Developments
Cincinnati	Jan. 11	Hotel Alms	S. L. Hoyt	Aspects of Metallurgical Research
Cleveland	Jan. 8	Cleveland Club	R. Schneidewind	Cast Iron
Dayton	Jan. 10	Engineers Club	A. J. Snyder	Application of Steels
Detroit	Jan. 8	Fort Shelby Hotel	R. H. McCarroll	Cast Steel in Automotive Work
Hartford	Jan. 9	Hartford Gas Co.	V. N. Krivobok	Stainless Steels
Indianapolis	Jan. 15	Washington Hotel	P. Payson	Corrosion Resisting Steels
Los Angeles		Scully's Cafe	V. T. Malcolm	Industrial Valves
Milwaukee	Jan. 9	Milwaukee Athletic Club	J. P. Gill	Tool Steels
Montreal	Jan. 9	Windsor Hotel	Bernard Collitt	Aero Engine Metallurgy
Muncie	Jan. 11	Y.M.C.A.	H. O. Jones	Flame Hardening
New Haven	Jan. 18	Hammond Laboratory, Yale University	J. R. Vilella	Microscopy
New Jersey	Jan. 15	Essex House, Newark	Hans Ernst	Physics of Metal Cutting
New York	Jan. 8	Building Trade Employers' Association Club-room	A. H. d'Arcambal	Machinability
North West	Jan. 8	Minnesota Union, Univ. of Minn.	J. P. Gill	20 Years of Tool Steel Metallurgy
Notre Dame	Jan. 10	Engineering Audit., Univ. of Notre Dame	J. P. Gill	20 Years of Tool Steel Metallurgy
Ontario	Jan. 5	Toronto	A. E. R. Westman and O. J. Shierholtz	Protection of Metals
Oregon	Jan. 5	Lloyd's Golf Club		
Penn State	Jan. 11		F. G. Tatnall	Physical Testing
Peoria	Jan. 12	Caterpillar Tractor Co.	J. P. Gill	Tool Steels
Philadelphia	Jan. 11	Engineers Club	Hans Ernst	Researches in Metal Cutting
	Jan. 26	Engineers Club	E. E. Legge	Austempering
Pittsburgh	Jan. 11	Roosevelt Hotel	K. R. Van Horn	Recent Non-Ferrous Developments
Rhode Island	Jan.			Smoker
Rochester	Jan. 8	Chamber of Commerce	John Johnston	Trends of Research in Metallury
Rockford	Jan. 24		C. L. Norton, Jr.	Refractories in Heat Treating
Saginaw Val. Group	Jan. 16	Durant Hotel, Flint, Mich.		Round Table Discussion
Springfield	Jan. 15	Hotel Worthy	V. O. Homerberg	Surface Hardening of Steels
St. Louis	Jan. 19	York Hotel	R. S. Archer	Some Aspects of Steel Mill Metallurgy
Syracuse	Jan. 9	Onondaga Hotel	N. E. Woldman	Machinability of Steels
Texas	Jan. 19		J. F. Lincoln	Fusion Welding
Toledo Group	Jan. 22	Hillcrest Hotel	R. G. McElwee	Cast Iron
Tri-City	Jan. 9	Rock Island Arsenal	D. L. Colwell	Die Castings
Washington	Jan. 8	Garden House, Dodge Hotel	Waldemar Naujoks	Forgings
Worcester	Jan. 17	Sanford Riley Hall, Wor. Polytech. Inst.	C. H. Jennings	Welding Design
York	Jan. 17		Everett Chapman	Welding